

4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

4.1 PRODUCTION

Diazinon is the Ciba-Geigy Corporation trademark name for the active ingredient O,O-diethyl-0-(2-[1-methylethyl]-4-methyl-6-pyrimidinyl) phosphorothioate. This insecticide is produced commercially by reacting 2-isopropyl-4-hydroxy-6-methylpyrimidine and O,O-diethyl phosphorochloridothioate (HSDB 1996). Ciba-Geigy Corporation produced this chemical in McIntosh, Alabama until 1994 (SRI 1994, 1995). Currently, diazinon is produced by Drexel Chemical Company in Cordele, Georgia and by SureCo Inc. in Fort Valley, Georgia (SRI 1995).

Estimated diazinon production in the United States for 1982 was 2.63 million kg (5.8 million pounds) (HSDB 1996). No more recent production estimates for diazinon are available. As with many toxic chemicals, especially those whose production or use involves proprietary information, quantitative estimates of production are virtually impossible to obtain (Bason and Colborn 1992).

No current information is available from the Toxics Release Inventory database on facilities that manufacture or process diazinon, the intended use, or the range of maximum amounts of diazinon that are stored on-site because diazinon was not one of the chemicals that facilities were required to report (EPA 1995a, 1995b). Beginning on January 1, 1995, however, diazinon was listed as one of the newly added chemicals that manufacturing and processing facilities would be required to report under Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) (EPA 1995b). Although no production and use data are currently available, information for 1995 should be available in the TR195 database listing in 1997.

4.2 IMPORT/EXPORT

Official government statistics on imports and exports for chemicals such as diazinon are summarized under broad generic categories such as “pesticides” or “organophosphates.” In 1982, estimated diazinon imports to the United States were 6.41×10^4 kg (141,000 pounds) (HSDB 1996). No recent estimates are available on the volume of diazinon imported into the United States. Data on past and/or current import volumes are not adequate to assess trends in import volumes of this pesticide.

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Little quantitative information was found on either past or current volumes of diazinon exported from the United States. With respect to exports, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) generally prohibits the EPA from releasing complete information on pesticide production, sales, and distribution (FASE 1996). In a recent report by the Foundation for the Advancement of Science and Education, the authors report that no government agency maintains current records concerning what specific pesticides are exported by the United States. Between 1992 and 1994, 1.1 billion pounds of pesticides were exported with their exact chemical name omitted from the shipping records. Of the 25% of all pesticide exports that could be identified to a specific chemical, these authors identified export volumes of diazinon for 1992, 1993, and 1994 of 4.7 million, 5.0 million, and 3.4 million pounds, respectively. The remaining 75% of all exported pesticides could not be identified to a specific chemical (FASE 1996). Thus, export volumes for diazinon for 1992, 1993 and 1994 could actually be four times higher than the export volume identified (FASE 1996). Data on past and/or current export volumes are not adequate to assess trends in export volumes of this pesticide.

4.3 USE

Diazinon is an organophosphate pesticide which was first registered for use in the United States in 1956 (EPA 1990b). It was first developed as a nonsystemic insecticide and nematocide for use against soil insects and pests of fruit trees and vineyards, vegetables (e.g., corn, potatoes), rice, sugarcane, forage, range, pasture, grasslands, tobacco, and horticultural crops (Farm Chemicals Handbook 1993; Worthing and Walker 1983). Diazinon is used to control flies around refuse storage areas and in fair grounds, zoos, animal facilities, or other businesses and public places where food or animal wastes might accumulate (Anonymous 1989; Williams et al. 1985). It is also used against flies in greenhouses and mushroom houses. Other uses include applications as a topically applied pesticide agent (e.g., aerosols, sprays, dips, ear tags) on livestock to control biting insects or skin parasites and in pet collars to control ticks in veterinary applications (EPA 1990b; Wester et al. 1993; Worthing and Walker 1983).

With the steady elimination of older organochlorine pesticides from the market, diazinon has replaced many of the organochlorine pesticides such as chlordane. In addition to applications in agriculture, diazinon is heavily used in urban areas (Farm Chemicals Handbook 1993). It is used extensively in home and garden applications and in formulations designed to prevent such pests as crickets or

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cockroaches from infesting homes or offices. It is commonly used in the form of pest control strips around entry ways (Jackson and Lewis 1981) and is often sprayed in offices as a general purpose fumigant (Currie et al. 1990). It was formerly used on golf courses and large sod farms for control of grubs and nematodes in turf, but these uses were suspended in the 1980s first in the United States and then in Canada, after deaths occurred in migratory waterfowl (Frank et al. 1991a; Kendall et al. 1993). Various types of diazinon formulations are produced including dusts, emulsifiable concentrates, granules, impregnated materials, microencapsulated forms, pressurized sprays, soluble concentrates, and wettable powders (EPA 1990b).

Estimated diazinon use in the United States was 2.6 million pounds (1.18 million kg) of active ingredient for 1983 (Gianessi 1986) and 10 million pounds (4.5 million kg) of active ingredient for 1985 (EPA 1990b). It was estimated that up to 43% of the diazinon applied in this country in 1982 was for non-agricultural uses, 21% was used on field crops (e.g., peanuts, rice, sugarcane, small grains, and citrus), 12% on alfalfa, 5% on corn, 5% on soybeans, 5% on vegetables, 3% on fruit and nut trees, 2% on wheat, 2% on cotton, and 2% on sorghum (HSDB 1996). More recent information on applications for this pesticide was not located.

4.4 DISPOSAL

Diazinon is currently considered a toxic chemical under Section 313 of the Emergency Planning and Community Right-To-Know Act (EPA 1995a, 1995b). Disposal of wastes containing diazinon is controlled by a number of federal regulations (see Chapter 7).

Diazinon undergoes rapid chemical hydrolysis under both alkaline and acid conditions. Alkaline hydrolysis results in complete degradation of diazinon to the alkaline salt of diethylthiophosphoric acid and 2-isopropyl-4-methyl-6-hydroxypyrimidine, which are considerably less toxic than diazinon. Acid hydrolysis in the presence of excess water results in the same hydrolysis products as in alkaline hydrolysis. However, with insufficient water in the acid medium, highly toxic tetraethykdithio- and thiopyrophosphates have been produced. Residuals were once acidified and then discharged or soil applied, with the addition of water for dilution. Without careful controls, the direct acid hydrolysis of diazinon can produce a variety of products, many of which are equal to or exceed the toxicity of the original active ingredient (HSDB 1996; IRPTC 1985; Sovocool et al. 1981). For ultimate disposal, large amounts of diazinon residuals should be incinerated in a unit with effluent gas scrubbing, while

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controlled hydrolysis or innovative bioremediation techniques may be appropriate for disposal of smaller quantities of diazinon (IRPTC 1985).

Currently, empty pesticide containers should be triple rinsed with water and then transferred to a proper hazardous waste disposal facility. On February 11, 1994, the EPA proposed container design requirements for nonrefillable and refillable pesticide containers. This FIFRA authorized action also includes standards on pesticide removal from containers before disposal, standards for containment of bulk pesticide containers, and procedures for container refilling operations (26 FR 6712 “Standards for Pesticide Containers and Containment”) (EPA 1994a).

No information was found on the past and present volumes of diazinon or diazinon-contaminated wastes disposed of by each disposal method.